How does education affect labour market outcomes?

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Abstract. *The paper aims to identify and characterize certain relationships that might appear between the access to education and the labour market outcomes. It emphasizes several aspects of education influencing labour market outcomes pointing out which are the main outcomes impacted by education. The analysis is focused on 32 European countries, while data on United States and Japan are also considered. Within this study, the access to education is defined in terms of participation and investments (expenditure on education and research, financial aid to students, funding of education). Labour market outcomes are assessed mainly using different employment/ unemployment rates as well as elements of wages and earnings. The findings show that the higher one's level of education, the better one's chances of getting a job and keeping the status of employed person in times of crisis on labour market. A higher participation in education is not necessarily associated with a higher employment rate, since the entry on the labour market occurs for some individuals as an alternative to continuing their education.*

Keywords: education, labour market, labour market outcomes.

JEL Codes: I25, J21, J24, J30

1. Introduction

Education is frequently seen as a crucial policy instrument in the fight against poverty as it may help individuals to access better jobs that raise their labour earnings and thus contribute to the improvement of their lives.

On the labour market, education provides both productive capacities to individuals and their signals to potential employers – hence, attained qualifications are a main asset in worker competition for jobs available on the labour market (Gangl, 2000, p. 3).

The labour market outcomes influenced by education are diverse and there are various pathways through which education operates when generating this type of effects.

Following the broad interest manifested both in the research literature and among policy-makers for the study of impact of education on labour market outcomes, the present paper aims to identify and characterize certain relationships that might appear between access to education and the labour market outcomes. The analysis is focused on 32 European countries, while data on United States and Japan are also considered.

The research has been organized as follows: it first presents a short literature review about the relationship between education and labour market outcomes, focusing on: mechanisms by which education affects individuals' outcomes on labour market, types of such outcomes impacted by education, gender differences in education and labour market outcomes; the next section describes the methodological issues

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(sample, indicators, method); the paper continues with the presentation of the main results concerning the way education affect labour market outcomes and ends with a discussion and conclusion.

2. A short literature review on the relationship between education and labour market outcomes

A considerable amount of literature (for example, Mincer, 1958, 1974; Glewwe, 1996; Gangl, 2000, 2001; Hauser et al., 2000; Margolis and Simonnet, 2003; Tansel, 2004; Pascarella and Terenzini, 2005; Goldberg and Smith, 2007; Stiglitz et al., 2009; Edgerton et al., 2012) has been published on the relationship between education and labour market outcomes. The author has identified the following aspects as being central in the scientific debate on this relationship:

1) Mechanisms by which education affects labour market outcomes

Pathways through which education operates when affecting individuals' outcomes on labour market are numerous and diverse: years of schooling; educational level attained; attainment of a particular credential; educational system; investments in education; schooling quality; individual's educational track; parents' educational track; curriculum type; and sector of activity.

- *Years of schooling*

A large amount of modern empirical work on the labour effects of education builds on the classic model of Jacob Mincer (1958, 1974) and Becker (1964), whose equation states that the natural logarithm of annual earnings or of the hourly wage depends linearly on years of schooling controlling for experience and experience squared (Goldberg and Smith, 2007, pp. 3-4).

- *Educational level attained*

Evidence shows that educational level attained has essential net effects (controlling for several relevant social background variables) on occupational status, meaning that higher education provides a substantial advantage over a high school diploma (Pascarella and Terenzini, 2005), while high school and postsecondary education provide a better occupational status than sub-high school levels of education (Hauser et al., 2000; Pascarella and Terenzini, 2005, cited in Edgerton et al., 2012, p. 268).

- *Attainment of a particular credential*

Another hypothesis which can be found in the literature (Edgerton et al., 2012, p. 266) states that the significance the attainment of a particular credential has to employers about the characteristics of a potential employee (i.e., values, aspirations, habits, etc.) is more important in enhancing an individual's educational returns than the increased level of knowledge per se.

In the labour market, a person's academic credentials signify to employers a specific pathway of achievement or performance, as well as the future performance potential of that person as an employee. Vocational credentials may specifically signify that an individual is formally qualified (i.e., has completed the requisite training) for a particular job. Moreover, in some professions requiring certain higher education credentials actions as a function of social selection and stratification (Edgerton et al., 2012, p. 266).

- *Educational system*

International comparisons of educational systems presented in the literature (OECD, 2002; Damoiselet and Lévy-Garboua, 1999, cited in Margolis and Simonnet, 2003, p. 2) argue the important role that educational system plays in the school-to-work transition process and emphasize the importance of a professional or technical education and private sector involvement in the educational process.

- *Investments in education*

Investments in education help to broaden access to education and hence facilitate the access to skills enabling peoples to get better jobs. Vast research literature provides evidence of the value of investing in education to develop human capital (see Fasih, 2008, for references).

- *Schooling quality* (Tansel, 2004, p. 40).
- *Individual's educational track*

Margolis, Simonnet and Vilhuber (2001) identified a link between an individual's educational track and the quality of his or her labour market networks (Margolis and Simonnet, 2003, p. 2). They found that the educational track also has an important direct effect on labour market outcomes (the time to the first stable job and earnings), independently of the effect it has on the means of job finding (Margolis and Simonnet, 2003, p. 29).

- *Parental educational background* (Tansel, 2004, p. 40).

- *Curriculum type*

According to Gangl (2000, p. 17), apprenticeships perform very favourably, both compared to school-based education at the same level of training and across qualificational levels, which is confirmed by unemployment rates for apprentices that are similar to those of tertiary level leavers.

- *Sector of activity*

Glewwe (1996) reveals that the wage structures in the private sector reflects the impact of education on the workers' productivity more than they do in the public sector.

2) Labour market outcomes impacted by education

According to empirical evidence from literature (for example, Soloman and Fagano, 1997; Gangl, 2000, 2001; Margolis and Simonnet, 2003; Goldberg and Smith, 2007; Stiglitz et al., 2009; Edgerton et al., 2012), they usually refer to: wages and earnings; the time to the first stable job; employment/ unemployment; worker productivity; hours worked; nature of work; worker's health; and fringe benefits.

- *Wages and earnings*

Following an extensive review of the economic literature about the impact of education on earnings, Card (1998) concluded that the effect of education on earnings is variously conditioned by a host of other variables: "the return to education [...] may vary with other characteristics of individuals, such as family background, ability, or level of schooling " (Card, 1998, p. 2). When all other characteristics are similar, education has a positive influence on earnings as Soloman and Fagano (1997, p. 826) summarize, "everything else being equal, those with more and better education seem to earn more" (cited in Edgerton et al., 2012, p. 271). Arguments for the fundamental role of education in increasing individual earnings may also be found in Tachibanaki (1997) and in Fasih (2008, pp. 8-9).

- *Time to the first stable job*

Margolis and Simonnet (2003, p. 92) highlighted that time to the first stable job is significantly influenced by individual's educational track. Simonnet and Ulrich (2000) and Bonnal et al. (2002) had previously shown in their studies that, in France, students who obtained their degrees with an apprenticeship component find their jobs faster and earn more than those who had an exclusively school-based education (Margolis and Simonnet, 2003, p. 1).

- *Employment/ unemployment*

Better-educated people typically have lower unemployment (Stiglitz et al., 2009, p. 46) as, regularly, unemployment rates decline with increasing levels of qualifications (Gangl, 2000, p. 17).
Moreover, those with higher educational attainment have greater "ability to benefit from disequilibria" (Bowles et al., 2001), while the least qualified workers are the most vulnerable to unemployment during economic downturns (Gangl, 2001).

- *Worker productivity*

At the individual level, increased education increases worker productivity securing better employment and enhanced lifetime earnings for the individual (Edgerton et al., 2012, p. 266).

- *Hours worked*

- *Nature of work*

Following a review of literature pertaining to the relationship between education and nature of work Edgerton et al. (2012) concluded that individuals with higher education are more likely to be involved in

work with greater intrinsic and extrinsic rewards. For example, more educated individuals are less likely to be involved in alienating repetitive labour and more likely to be involved in work that permits greater autonomy (developing and reinforcing feelings of self-efficacy), creativity, more novelty and opportunity for continued learning and personal growth (Mirowsky and Ross, 2003, 2005; Ross and Wu, 1995; Schieman, 2002, cited in Edgerton et al., 2012, p. 274), and greater social support which enhances resilience to psychological distress, depression, and anxiety (Ross and Van Willigen, 1997, cited in Edgerton et al., 2012, p. 274).

Aggarwal et al. (2010, p. 12) developed a linear model of occupational choice using educational attainment and other individual characteristics as explanatory variables which highlighted that, in all years, schooling raises the probability with which an individual enters non-manual work, and reduces the probability with which an individual enters manual work.

- *Worker's health*

Education appears to have positive effects on worker's health too, as higher education typically leads to occupations that involve less health risk and provide greater financial capacity to purchase better housing, nutrition, and health care (Edgerton et al., 2012, p. 275).

- *Fringe benefits*

According to Goldberg and Smith (2007, p. 14), education increases fringe benefits. They give the example of the incidence of employer provided health insurance that increases with education in the US.

3) Gender differences in educational and labour market outcomes

Gender differences in labour market outcomes induced by education depend mainly on pathways from school to further education and work.

Lamb (2001) investigated graduates of diploma and degree courses and found that the highest weekly earnings were achieved by male graduates who studied part-time while working. The next highest average weekly pay was obtained by male graduates who went directly from school to study and then into full-time work. The relationship between pathway and income was different for females as they appeared to get better earnings when studying and then working, even if they spent some time finding a job, than when combining work with part-time study. Lamb also found that, in all pathways, average weekly earnings of female workers were lower than those of their male counterparts. Lamb (2001) explained the differences in earnings between males and females partly by differences in the sorts of jobs they obtained.

Despite unfavourable differences in earnings for females, empirical studies (Psacharopoulos, 1994; Tansel, 2004) found that overall women's returns to education are higher than those of men, involving for women greater positive effects of each additional year of education than for men.

3. Material and method

In this study, the access to education and training is defined in terms of *participation* and *investments*. Participation means that an individual has had the opportunity to experience an education or training opportunity. By linking access with participation, this approach allows for the fact that entrance into education can provide individuals with knowledge and skills - and the economic returns associated with them - even when they do not complete their educational/ training programme. Investments refer to expenditure on education, financial aid to students, funding of education. Labour market outcomes are assessed mainly using different employment/ unemployment rates, as well as elements of earnings.

Data source used to describe access to education and labour market outcomes is *Eurostat* database.

Table 1 presents the variables considered in the analysis. The reference year is 2009 for all the variables, with the exception of *earnings* which are reported for 2010. The sample includes 32 European countries, while data on US and Japan are considered where possible for comparison reasons.

The paper examines overall levels of access to education and overall labour market outcomes in order to achieve an explanatory comparative analysis of the performance of analyzed countries in relation to these

two dimensions, to identify how participation and investments in education affect employment and earnings and to provide suggestions about the appropriate investment to stimulate each type of outcomes.

The study also explores if investments done for a particular level of education have a greater impact on labour market outcomes and hence might be of relevance to policymakers.

In order to link various variables that describe access to education to labour market outcomes for different levels of education, several Principal Components Analyses (PCA) were run. This type of analysis is justified by data set dimension (up to 16 quantitative variables for 32 countries). PCA allows a set of correlated variables to be transformed in a smaller set of hypothetical uncorrelated constructions called principal components. These principal components are then used to discover and describe the dependencies among variables and to study the relationships that might exist among cases (Timm, 2002).

Analysis of correlation is used to confirm and / or to complete findings resulted from PCA.

Table 1 Variables used in the analysis

Variables	Level
Investments in education	
Annual expenditure on public and private educational institutions per pupil/student in EUR PPS, based on full-time equivalents	For all levels of education combined; At primary level of education (ISCED 1); At secondary level of education (ISCED 2-4); At tertiary level of education (ISCED 5-6)
Total public expenditure on education as % of GDP	
Public subsidies to the private sector as % of GDP	For all levels of education combined
Financial aid to pupils and students as % of total public expenditure on education	For all levels of education combined
Total intramural gross domestic expenditure on R&D (GERD) (euro per inhabitant)	All sectors
Participation in education and Life-long learning	
Students (ISCED 1_6) aged 15-24 years (as % of corresponding age population)	Total
Life-long learning: Participation of population aged from 25 to 64 years in education and training (%)	Total
Labour market outcomes	
Employment rate of population aged from 25 to 64 years (%)	All ISCED 1997 levels; Pre-primary, primary and lower secondary education (levels 0-2); Upper secondary and post-secondary non-tertiary education (levels 3-4); Tertiary education (levels 5-6) (ISCED 1997)
Unemployment rate of population aged from 25 to 64 years (%)	
Mean hourly earnings (euros)	All ISCED 1997 levels; Pre-primary and primary education (levels 0 and 1); Lower secondary or second stage of basic education (level 2); Upper secondary and post-secondary non-tertiary education (levels 3 and 4); First stage of tertiary education, programmes that are theoretically based/research preparatory or giving access to professions with high skills requirements (level 5A); First stage of tertiary education, programmes which are practically oriented and occupationally specific (level 5B); Second stage of tertiary education leading to an advanced research qualification (level 6) (ISCED 1997)

In order to verify the adequacy of data for a factorial analysis, the Barlett's test of sphericity (to test the null hypothesis that the variables in the correlation matrix of the population are uncorrelated), and the indicator MSA (Measure of Sampling Adequacy) of Kaiser-Meyer-Olkin (to evaluate in which degree each variable may be predicted by all the other variables) were used. The results obtained by data processing with

SPSS are presented below each graphical representation of factorial planes resulted from PCAs. The significance level associated to Barlett's test of sphericity, Sig = 0.000, is smaller than 0.05 (conventional value) for all the analyses conducted, which means the null hypothesis of variables' uncorrelation is rejected. Therefore one can conclude that the considered variables are adequate for a PCA in each of the situations considered. The values of the indicator MSA of KMO, greater than 0.5 and closed to 0.8 in all the cases, also indicate the suitability of the considered data for factor analysis.

In situations where some variables present correlation coefficients with factorial axes having comparable values on both axes, for a better interpretation of PCA results a rotated solution is generated using Oblim/ Promax with Kaiser Normalization method, available in SPSS software.

4. Results

The variance the first two factorial axes in PCA account for ranges between 73% - 97% of the total variance within the analyses conducted so that the characteristics of access to education and labour market outcomes in selected countries will be analyzed below according to the positions of variables and of cases in the factorial plane determined by these first two components.

Graphical representation of the positions of variables describing participation and investments in education on the plane of the first two factorial axes (Fig. 1) shows the following:

- a direct moderate to weak relationship between participation in education and investments;
- a direct quite strong relationship between participation in life-long learning and investments;
- both participation in standard education and in life-long learning appear to be more associated to investments in the form of expenditure and less to those in the form of subsidies or funding;
- participation in education seems to be the least correlated with the other variables, so that a factorial solution without this indicator is also generated (fig. 2), underlining investments' grouping in two different categories: expenditure type, on the one hand, and subsidies and funding type, on the other hand.
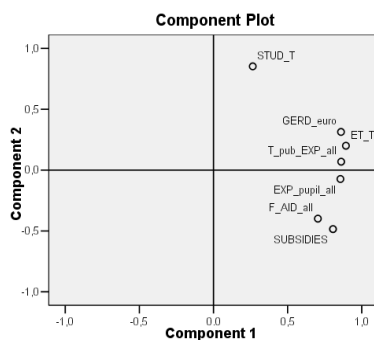
KMO = 0.699; Sig. for Bartett's Test = 0; Communalities > 0.65; Variance explained by CP1 = 60.397%; Variance explained by CP1 & CP2 = 78.528%;
Source: Output obtained in SPSS with PCA

Fig. 1: The position of the variables that describe participation in education and in life-long learning and investments in education on the first factorial plane from PCA.
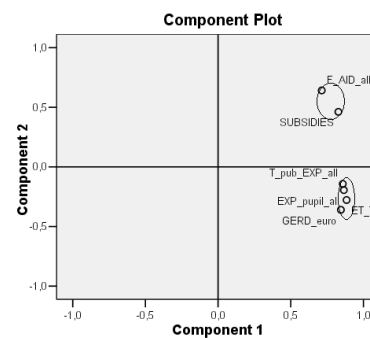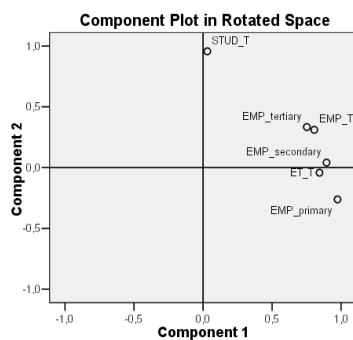

KMO = 0.694; Sig. for Bartett's Test = 0; Communalities > 0.75; Variance explained by CP1 = 69.57%; Variance explained by CP1 & CP2 = 84.398%
Source: Output obtained in SPSS with PCA

Fig. 2: The position of the variables that describe participation in life-long learning and investments in education on the first factorial plane from PCA.

Variables' coordinates on the first factorial plane resulted from PCA (fig. 3 and fig. 4) and values of Pearson correlation coefficients (table 2) between variables describing participation and labour market outcomes indicate that:

- There is an inverse relationship between participation in education and unemployment which, although weak, increases in intensity as the education level of unemployed increases. That is to say, the higher participation is, the lower unemployment is among people with higher levels of education.

- There is a direct relationship with moderate intensity between participation and employment, but stronger than that between participation and unemployment. In this case also, the connection is increasingly powerful as the level of education of employees increases, reaching a statistically significant value (Pearson correlation coefficient = 0.476, at the 0.01 level) at the level of tertiary education.

- The closer link between participation and employment indicators lead to the conclusion that enhancing access by fostering a higher participation in education is usually associated with a higher level of employment.

- There has not been identified any relationship between participation in education and earnings at neither of the levels of education as confirmed by the values of the correlation coefficients which are very closed to zero.

- Participation in life-long learning correlates directly both with employment and with level of earnings.

- The values of Pearson correlation coefficients express a higher influence of life-long learning on the level of employment of people with pre-primary, primary or lower secondary education. Relationship between life-long learning and employment slightly decreases in intensity as the level of education of employed people increases.

KMO = 0.811; Sig. for Bartett's Test = 0; Communalities > 0.82; Variance explained by CP1 = 67.847%; Variance explained by CP1 & CP2 = 83.929%; Rotation Method: Oblimin with Kaiser Normalization
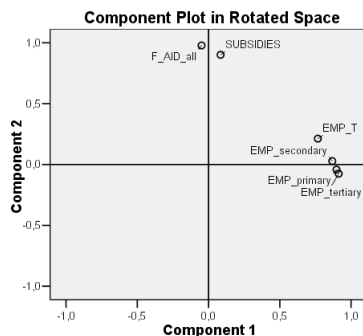*Source: Output obtained in SPSS with PCA*

Fig. 3: The position of the variables that describe participation in education and in life-long learning and employment on the first factorial plane from PCA.
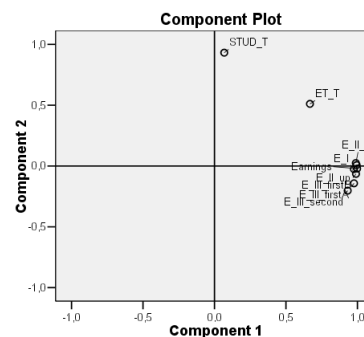
KMO = 0.811; Sig. for Bartett's Test = 0; Communalities > 0.7; Variance explained by CP1 = 79.630%; Variance explained by CP1 & CP2 = 92.922%
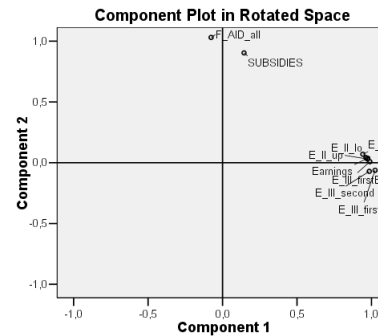*Source: Output obtained in SPSS with PCA*

Fig. 4: The position of the variables that describe participation in education and in life-long learning and earnings on the first factorial plane from PCA.

KMO = 0.781; Sig. for Bartett's Test = 0; Communalities > 0.76; Variance explained by CP1 = 64.689%; Variance explained by CP1 & CP2 = 82.03%; Rotation Method: Oblimin with Kaiser Normalization
Source: Output obtained in SPSS with PCA

Fig. 5: The position of the variables that describe investments in education under the form of subsidies and financial aids and employment on the first factorial plane from PCA.

KMO = 0.778; Sig. for Bartett's Test = 0; Communalities > 0.89; Variance explained by CP1 = 83.897%; Variance explained by CP1 & CP2 = 97.083%; Rotation Method: Oblimin with Kaiser Normalization
Source: Output obtained in SPSS with PCA

Fig. 6: The position of the variables that describe investments in education under the form of subsidies and financial aids and earnings on the first factorial plane from PCA.

The position of variables SUBSIDIES and F_AID_all on the plane of the first two principal components identifies them as determining an independent component, both when being analyzed with employment and when considered together with earnings (fig. 5 and fig. 6). The fact denotes the inexistence of a clear relation between this type of investments in education and the investigated labour market outcomes. Pearson correlation coefficients (table 2) however show a moderate direct relationship between the public subsidies to private sector and employment, as well as between subsidies and earnings, the relation being more intense in the case of employment rate for those with upper secondary and post-secondary non-tertiary education and, respectively, in the case of mean hourly earnings of those with pre-primary and primary education. There is a weak direct relationship both between financial aid to students and employment and between financial aid and earnings. The most intense relation occurs between financial aid to students and earnings of those with pre-primary and primary education.

Table 2 Pearson correlation coefficients

	STUD_T	ET_T	SUBSIDIES	F_AID_all	T_pub_EXP_all	EXP_student_III
Employment						
EMP_T	0.508**	0.691**	0.590**	0.527**	0.600**	0.462*
EMP_primary	0.118	0.696**	0.464*	0.356	0.660**	0.553**
EMP_secondary	0.298	0.661**	0.503**	0.422*	0.555**	0.681**
EMP_tertiary	0.476**	0.554**	0.405*	0.363	0.439*	0.353
Unemployment						
UNEMP_T	-0.205	-0.401*	-0.412*	-0.323	-0.281	-0.482*
UNEMP_primary	-0.003	-0.430*	-0.342	-0.219	-0.432*	-0.508**
UNEMP_secondary	-0.181	-0.404*	-0.426*	-0.370	-0.225	-0.499*
UNEMP_tertiary	-0.364*	-0.319	-0.371	-0.329	-0.062	-0.298
Earnings						
Earnings	0.080	0.663**	0.499**	0.343	0.588**	0.922**
E_I	0.193	0.599**	0.636**	0.495*	0.639**	0.907**
E_II_lo	0.132	0.679**	0.523**	0.363	0.648**	0.902**
E_II_up	0.093	0.690**	0.497**	0.358	0.572**	0.910**
E_III_firstA	0.018	0.563**	0.407*	0.273	0.492**	0.886**
E_III_firstB	-0.070	0.665**	0.475*	0.305	0.575**	0.891**
E_III_second	0.005	0.496*	,493*	,410	0.616**	0.808**

**Correlation is significant at the 0.01 level (2-tailed).
*Correlation is significant at the 0.05 level (2-tailed).

The position of variables expressing expenditure on education on the first factorial plane resulted from PCA (fig. 7 and fig. 8) suggests the following:

- Expenditure on education is generally positively correlated with earnings.

- It can be identified a stronger relationship between annual expenditure per pupil or student and earnings than between total public expenditure on education and earnings. Moreover, annual expenditure per student at tertiary level of education appears to be the variable of investment the most correlated to earnings (as confirmed by Pearson correlations with values over 0.9 with the earnings of those with pre-primary, primary, secondary or post-secondary non-tertiary education, around 0.89 with the earnings of those who completed first stage of tertiary education and over 0.8 with the earnings of those who completed second stage of tertiary education, all significant at the 0.01 level).

- There is a more powerful relation between employment rates and total public expenditure on education than between employment rates and annual expenditure per pupil or student.

- There is a strong relationship both between gross domestic expenditure on R&D per inhabitant and employment and between gross domestic expenditure on R&D and earnings.
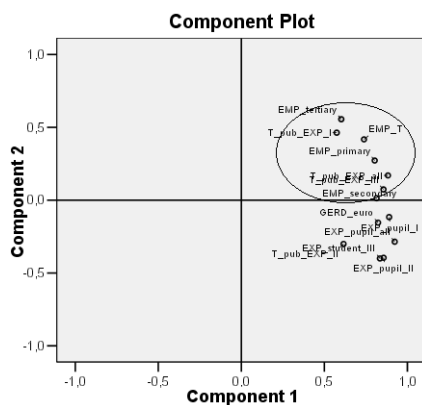
KMO = 0.687; Sig. for Bartett's Test = 0; Communalities > 0.66, excepting for T_pub_exp_I and T_pub_exp_II whose values are around 0.5; Variance explained by CP1 = 62.998%; Variance explained by CP1 & CP2 = 73.242%;
Source: Output obtained in SPSS with PCA

Fig. 7: The position of the variables that describe expenditure in education and employment on the first factorial plane from PCA.
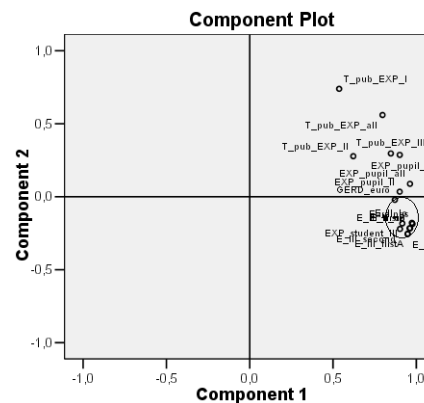
KMO = 0.688; Sig. for Bartett's Test = 0; Communalities > 0.75, excepting for T_pub_exp_II whose value is around 0.5; Variance explained by CP1 = 78.319%; Variance explained by CP1 & CP2 = 87.619%
Source: Output obtained in SPSS with PCA

Fig. 8: The position of the variables that describe expenditure in education and earnings on the first factorial plane from PCA.

Following the preliminary PCAs within the initial data set, the next variables describing access to education in terms of investments appear to have the greatest influence on labour market outcomes: Exp_student_III, GERD_euro, and T_pub_exp. Graphical representation of the variables' positions on the plane of the first two factorial axes (Figure 9) after selection of variables of access to education the most relevant for labour market outcomes highlights clearly the principal components: investments in education that enhance earnings (first axis) and investments in education that support high employment (second axis).

Overlapping of graphical representation of countries on the factorial map and variables map obtained with PCA (Figure 9) permits us to identify some characteristics of the relationship between access to education and labour market outcomes in selected countries, using the rule of the *3σ* on each factorial axis. One must look for the counties that are situated outside the intervals: $\bar{x} \pm \sigma$, $\bar{x} \pm 2\sigma$ and, respectively,

$\bar{x} \pm 3\sigma$ corresponding to the two axes and marked on the graph by stippled lines ($\bar{x} = 0, \sigma = 1$) (Jaba, 2007; Dühr, 2005, 1167-1182).

The component of investments in education that enhance earnings places Denmark, Norway, Sweden and Finland over the limit $x + \sigma$, as having the highest mean hourly earnings, gross domestic expenditure on R&D per inhabitant and annual expenditure per student at tertiary level of education. These countries are followed by six of the EU 15 states, Belgium, Germany, Austria, Netherlands, France and United Kingdom, at the upper limit of $x \pm \sigma$ interval. All of them are situated inside the interval but in opposition to 9 of the 12 new member states of EU, which are placed on or outside the lower limit of $\bar{x} \pm \sigma$ interval. Among EU new members, Cyprus and Slovenia have the best positions on this axis, but still with negative values of their coordinates. Among older EU states, Portugal has the most unfavourable uncomfortable position, being situated closer to new members than to EU15 countries. Island, Cyprus, Spain, and Italy record average values for these indicators. According to their position on the first axis, Romania, Bulgaria, Latvia and Lithuania manifest the lowest interest in investing in research and development and in students at tertiary level of education.

According to the second axis, the highest percentage of the total public expenditure on education in GDP and the highest employment are found in Island and Denmark, followed by Norway, Sweden, and Cyprus, which are positioned over the limit $\bar{x} + \sigma$. At the opposite side we find Italy, Romania, Spain and Slovakia, which exceed the limit $\bar{x} - \sigma$ on the second axis.

One can notice that 7 of the 9 new members (excepting for Slovenia and Estonia) are positioned inside the third quarter which is characterized both by low employment and earnings and by low investments in education for the support of these types of labour market outcomes.

The best performer on both components is Denmark followed by Norway and Sweden, which exceed the limit $x + \sigma$ on both axes, being characterized by the highest employment and earnings and by significant investments in education that improve labour market outcomes. The worst performer on the two components is Romania, followed by Slovakia which also exceeds the limit $\bar{x} - \sigma$ on both axes.

Mean hourly earnings are the labour market outcomes that, along with expenditure per student at tertiary level of education and gross domestic expenditure on research and development, appear to discriminate the most among surveyed countries, as they account for over 76% of the total variance.
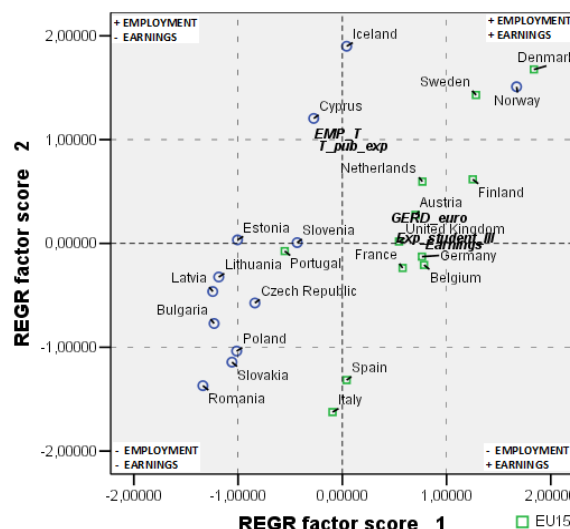
KMO = 0.739; Sig. for Bartett's Test = 0; Communalities > 0.84; Variance explained by CP1 = 76.006%; Variance explained by CP1 & CP2 = 89.945%; Rotation Method: Promax with Kaiser Normalization (rotation converged in 3 iterations), k=4
Source: Output obtained in SPSS with PCA
Fig. 9: Countries' and variables' position on the first two factorial axes.

Eight of the 32 surveyed countries aren't represented on the scatter-plot as they present missing values for at least one variable included in the analysis. The situation of these countries with regard to access to education and labour market outcomes will be discussed below on the basis of available data (table 3). Hungary, Croatia and Turkey recorded values below the EU27 average, which may indicate their positioning in the third quarter. Switzerland and Luxembourg present values higher than EU27 average, some of them close to those of the best performers, which could place them inside the first quarter of the factorial plane. Ireland and Malta present values both below and above EU27 average, indicating a possible positioning of them inside the second or the fourth quarter.

In terms of annual expenditure per pupil/student both US and Japan record higher values than EU27 average for all levels of education combined as well as for each level of education considered separately. If the values of Japan are only 1.03-1.25 times higher than those of EU 27, US values are far superior compared to EU 27 average, ranging from 143% at primary level of education to 246% at tertiary level (table 4). While at primary and at secondary level of education we can identify European countries which spend for a pupil about as much or more than the US (LUX, NO, DK, CY, IS and, respectively LUX, NO, Austria), when considering the tertiary level of education, the difference is huge in favour of the US, which invests 22734.1 monetary units for a student compared to only 14523.9 in Sweden and 15045.6 in Norway, the European countries with the highest values for this indicator.

As regards the percentage of the total public expenditure on education in GDP, EU27 accounts proportions that are close to those existing in the US and slightly higher than in Japan (table 4).

In terms of investments in education under the form of public subsidies to the private sector and financial aid to pupils and students, EU27 average shares are significantly higher than those registered in the US and Japan (table 4).

Table 3 Available values for the countries with missing data

Country	EXP_student_III	T_pub_EXP_all	GERD_euro	EMP_T	Earnings
Ireland	-	6.50	629.2	68.5	25.51
Greece	-	-	-	68.3	-
Luxembourg	-	-	1256.9	73.2	21.95
Hungary	-	5.12	106.4	63.6	4.59
Malta	10113.7	5.46	76.8	57.7	-
Switzerland	-	5.55	-	82.7	25.74
Croatia	6522.6	4.33	85.8	63.9	-
Macedonia	-	-	-	51.2	-
Turkey	-	-	52.3	49.3	4.25
EU 27	*9243.7*	*5.41*	*473.6*	*71.0*	*-*
Best performer	*15045.6*	*8.72*	*1274.1*	*82.7*	*27.37*
	Sweden	*Denmark*	*Finland*	*Switzerland*	*Norway*
Worst performer	*3246*	*4.09*	*24.3*	*49.3*	*2.04*
	Romania	*Slovakia*	*Bulgaria*	*Turkey*	*Bulgaria*

Source: Data extracted from Eurostat database

Table 4 Investments in education in United States, Japan and EU 27

Country	EXP_pupil(student)_all/ I /II/ III				T_pub_EXP_all / I / II/ III				SUBSIDIES	F_AID_all
United States	11369.5	7699.1	9423.5	22734.1	5.47	1.84	2.06	1.24	0.24	4.4
Japan	7484.0	5700.3	6834.7	11591.7	3.61	1.26	1.33	0.72	0.20	5.5
EU 27	6503.9	5383.2	6643.0	9243.7	5.41	1.24	2.41	1.22	0.53	6.7

Source: Data extracted from Eurostat database

5. Conclusions

Education is one of the main determinants of good labour market outcomes for individuals as it plays a central role in preparing individuals to enter the labour force by equipping them with the necessary skills.

Study of the literature showed that education may influence several labour market outcomes, such as: wages and earnings; the time to the first stable job; employment/ unemployment; worker productivity; hours worked; nature of work; worker's health; and fringe benefits. The mechanisms by which education affects labour market outcomes are diverse: years of schooling; educational level attained; attainment of a particular credential; educational system; investments in education; schooling quality; individual's educational track; parents' educational track; curriculum type; and sector of activity. Education may also lead to gender differences in labour market outcomes which depend mainly on pathways from school to further education and work. Despite unfavourable differences in earnings for females, overall women's returns to education are higher than those of men, involving for women greater positive effects of each additional year of education than for men.

The paper also examined how participation and investments in education affect employment and earnings, trying to identify the appropriate investment to stimulate each type of outcome. In order to link various variables that describe access to education to labour market outcomes for different levels of education, Principal Components Analyses (PCA) and analysis of correlation were used.

Variables' coordinates on the first factorial plane resulted from PCA and values of Pearson correlation coefficients between variables describing participation and labour market outcomes highlighted the following findings. A direct moderate to weak relationship exists between participation in education and investments. There is also a direct relationship with moderate intensity between participation and employment, which is increasingly powerful as the level of education of employees increases. There has not been identified any relationship between participation in education and earnings at neither of the levels of education as confirmed by the values of the correlation coefficients which are very closed to zero. Participation in life-long learning correlates directly with both employment and level of earnings. The relationship between life-long learning and employment slightly decreases in intensity as the level of education of employed people increases.

At the same time a high participation in education is not necessarily associated with a higher employment rate, since the entry on labour market occurs for some individuals as an alternative to continuing their education.

Following the preliminary PCAs within the initial data set, the variables Exp_student_III, GERD_euro and T_pub_exp that describe access to education in terms of investments appear to have the greatest influence on labour market outcomes. Annual expenditure per student at tertiary level of education was identified as the variable of investment the most correlated to earnings, employment rates are closer related to total public expenditure on education, while gross domestic expenditure on R&D per inhabitant presents a strong relationship with both employment and earnings.

Graphical representation of the variables' positions on the plane of the first two factorial axes after selection of variables of access to education the most relevant for labour market outcomes highlights clearly the principal components: investments in education that enhance earnings (first axis) and investments in education that support high employment (second axis). Overlapping countries' positions on the factorial map and variables' map obtained with PCA permits us to identify some characteristics of the relationship between investments in education and labour market outcomes in selected countries. The best performer on both axes is Denmark followed by Norway and Sweden, which are characterized by high employment and earnings as well as by significant investments in education that improve labour market outcomes. At the opposite side we find Romania and Slovakia which are the worst performers on the two components. Mean hourly earnings are the labour market outcomes that, along with expenditure per student at tertiary level of education and gross domestic expenditure on research and development, appear to discriminate the most among surveyed countries, as they account for over 76% of the total variance.

Research results lead to conclusion that investments in education have a direct effect mainly in stimulating the achievement of positive outcomes (employment, earnings) on labour market and less in reducing the negative ones (unemployment). The research is valuable for policy makers as it brings evidence that employment could be sustained by allocating a larger share of GDP for public expenditure on education,

while workers' hourly earnings could be improved by investing in research and development and in tertiary level of education.

6. Acknowledgements

7. References

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